

# Noncompliance of the postexposure prophylactic vaccination following animal bites reporting to a rural primary health center

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## ABSTRACT

**Context:** Man lives in close harmony with animals and so the chances of injuries and diseases contracted from them. Effective preventive measure such as vaccination is to be ensured following harmful bites resulting in Rabies. **Aim:** The aim is to assess the proportion of rabid animal bite cases and non-compliance of post exposure prophylaxis vaccination following bites, reporting to a rural primary health care centre. **Setting and Design:** This is a retrospective cross sectional study from records of animal bite cases attending a rural primary health centre from January 2017 to December 2017. **Materials and Methods:** A pre-designed case record form was used to estimate the proportion of animal bite cases leading to Rabies and Non-compliance of post exposure prophylaxis attending the health centre. **Statistical Analysis:** Data analysis was done in SPSS 2016. Chi square was used to find the significance. **Results:** Around 448 animal bites were found over a span of one year, out of which 222 (49.5%) were found to be rabid animal bites. 46.65% (209) were dog bites and 2.9% (13) were cat bites. Statistical significance ( $P < 0.05$ ) was seen between age and compliance of vaccination following dog bites. 1.14% of the study subjects who had completed the 5 dose post prophylaxis vaccination belonged to the elderly age group. Among the cat bite cases, 2 of the study subjects had received 1 dose of PEP with anti-rabies vaccine. **Conclusion:** Only 1.14% of the study subjects had taken the complete dose of PEP. This suggests the lack of awareness among public and lack of services and supervision for rabid animal bites in rural areas. It is the duty of every physician to counsel people, co-ordinate with veterinary physician and maintain proper records so as to ensure completion of PEP to prevent rabies related deaths in humans.

**Keywords:** Non-compliance, rabies, rural area

## Introduction

Animal bites pose a constant threat to humans and are a major public health problem worldwide. It has resulted in millions of injuries and many deaths globally.<sup>[1]</sup> Rabies, caused by lyssavirus, is one of the neglected tropical diseases that results in fatal neurological infection. Dog bites account for tens of millions of injuries annually, the highest risk is among children.<sup>[2]</sup> Rabies

virus most commonly enters the body through the saliva of an infected animal following bite, scratch, or lick on the intact mucous membrane and later affects the nerve. Domestic dogs are the most common reservoir of human disease and almost 99% rabies cases are caused by dog-mediated infection.<sup>[3]</sup> Worldwide, cat bites account for 2%–50% of injuries related to animal bites, second to dog bites in terms of incidence.<sup>[2]</sup> There is an estimated human death of 59,000 annually in over 150 countries because of rabies and 95% cases occur in Africa and Asia.<sup>[3]</sup> India accounts for 59.9% deaths in Asia and 35% of deaths globally.<sup>[3]</sup> Rabies is the 10<sup>th</sup> biggest cause of death among infectious disease in the world.<sup>[3]</sup> The initial symptoms are similar to flu-malaise, headache

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lasting for few days followed by delirium, hallucinations, and hydrophobia. Rabies is nearly fatal, usually within 10 days and only supportive treatment is indicated.

Vaccination is the most effective method for preventing infection in those getting animal bites. Postexposure immunization schedule consists of 5 doses of antirabies vaccine (ARV) to be given in specific duration. Pre-exposure prophylaxis is available to travelers visiting rabies endemic areas or persons at higher risk of contact with animals.<sup>[4]</sup> Rabies occurs most commonly in rural areas, with children being most commonly infected.<sup>[5]</sup> Eighty percent human deaths occur in rural areas because of lack of awareness about animal bites and poor accessibility or availability of vaccines. Further, at places where vaccine is available, we do not have adequate reporting system or patient data for monitoring. Rabies in humans can be eliminated by ensuring adequate animal vaccination and control, educating those at risk and increasing the access to medical care of the people bitten by animals.

World Health Organization (WHO) has set-up a global strategic plan to end human deaths from dog-mediated rabies by 2030.<sup>[6]</sup> Mass dog vaccinations are being carried out to prevent the chain of transmission of the virus in dogs and from dogs to humans. Proper notification and follow-up of the animal bite cases and strengthening of primary health centers are important. Education of people through mass media and campaigns and an integrated telecommunication system for tracking the patient details regarding their postexposure prophylaxis (PEP) status is essential.

Of the >55,000 persons who die annually of rabies worldwide, the majority either did not receive any PEP, received some form of PEP (usually without RIG) after substantial delays, or were administered PEP according to schedules that deviated substantially from current WHO recommendations.<sup>[7]</sup> In India, an analysis from 2 animal bite centers during 2001–2002 demonstrated that in 192 human rabies cases, all deaths could be attributed to failure to seek timely and appropriate PEP.<sup>[7]</sup> This research study explores the compliance of PEP following dog bite and the need to turn our focus toward ensuring complete schedule of PEP to prevent rabies in humans.

## Materials and Methods

### Study design

A record-based cross-sectional study design was used to assess the proportion of animal bites and noncompliance of PEP vaccination following bites, reporting to a rural primary health care center. The data were collected from registers maintained in the health center with the help of a predesigned and prevalidated case record form.

### Setting

This study was conducted in a primary health care center of rural area of Maharashtra for a duration of 3 months. Records were

maintained for various animal bites, in the health center out of which dog and cat bite cases were studied from the register and analysis was done. One-year (January 2017 to December 2017) data on cases of dog and cat bite were collected from the register.

### Participants

The study consisted of cross-sectional observational design, where quantitative data were collected by complete enumeration technique of the records maintained in the primary health care center. All the records of the cases of dog and cat bites from January 2017 to December 2017, which were registered in the health care center were evaluated. Other cases of bites caused by snakes, scorpion, rats etc., that attended the primary health care center from January 2017 to December 2017 whose detailed entry is maintained in the record book were excluded from the study.

### Measures

#### Demographic characteristics

These are the details regarding age, sex, and address of the cases of dog and cat bites.

#### Treatment

The immediate treatment provided to patients along with the details regarding the antirabies vaccination.

#### Follow-up and referral details

The details regarding follow-up for the scheduled vaccination among the cases. Referral details to higher centers were obtained.

### Ethics approval

The study was conducted after attaining approval from the Institutional Ethical Committee at Seth G.S Medical College and K.E.M hospital.

### Data collection techniques and tools

Data were entered in Microsoft Excel 2016 spreadsheet to organize and tabulate data for statistical analysis. Descriptive statistics was based on the objectives proposed and comprehended by using SPSS 2016.

Appropriate tests of significance were applied wherever applicable and  $P < 0.05$  was considered as statistically significant at 95% confidence limit.

## Results

Around 448 cases of bites were found to have been reported at the health center over a period of 1 year. The most common rabid bites reported at the health center were dogs and cats.

The total number of bite cases attending the primary health center over a span of 1 year was 448. Out of which, 222 (49.55%) cases were caused by rabid animal bites. Two-hundred and nine (46.65%) cases were dog bites and 13 (2.9%) cases were cat bites [Graph 1].

The mean age of the rabid animal bite cases was found to be 30.9 with a standard deviation of 6.31. None of the patients were referred to a higher center. There were no details about the site and severity of the animal bite in the records maintained. There were no records on the incidence of rabies in the area of the health center.

In our study, we have observed that the last 2 doses (ARV 4 and ARV 5) were taken mostly by the elderly population above 60 years of age. 1.14% dog bite cases who completed the entire PEP is the elderly. Thus, we found a statistical correlation between age and compliance of PEP significant at  $P < 0.05$  in our study.

This suggests that the elderly population are more compliant with the 5 doses of PEP following a dog bite.

The total number of cat bite cases attending the PHC over a span of 1 year is 13 (2.9%). Out of which, 9 cases (69.23%) were males and 4 cases (30.76%) were females. Two (15.3%) of them were given 1 dose of PEP with antirabies vaccine.

### Discussion

In our study, we found the proportion of dog bite cases attending the primary health center from 0 to 12 years to be 26.54% (56),

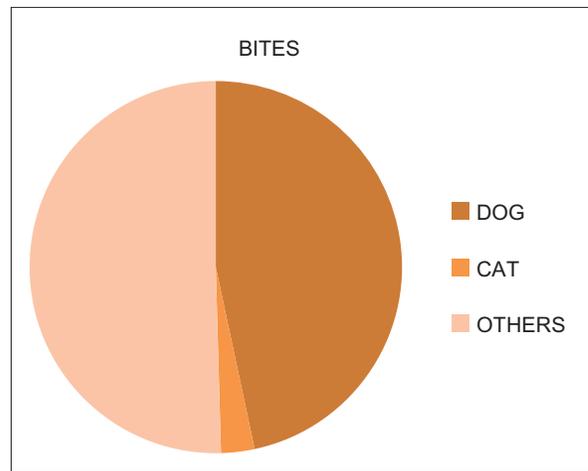
and 13 to 19 years to be 8.53% (18), 20 to 35 years was 24.64%, 36 to 59 years 27.27%, and >60 years 12.44%. The dog bites are seen in the mean age group of 30.9 years in our study that is almost similar to other previous studies.<sup>[8,9]</sup> Table 1 shows the demographic details of the rabid bite cases.

Our study findings suggest that among the dog bite cases, 64.11% bites were seen in females and 35.8% in males. This is contradictory to other studies reported so far.<sup>[3,8,10]</sup> This can be because of the fact that dog bite cases are under-reported in men as they are the working population and loss of wages being found as one of the factors influencing compliance of PEP in another study.<sup>[10]</sup> In our study, we found that 35.4% dog bites occurred in the age group of <19 years that is in accordance with other studies [Table 1].<sup>[3,9,10]</sup>

Our study finding shows that out of the 209 dog bites reported to the center over a span of 1 year, 176 (84.21%) bite cases had been given the first dose of ARV. Remaining 15.7% dog bite cases did not receive ARV. In a study conducted in the ivory coast of Africa, out of 533 dog bite cases reported, about 46.9% had abandoned vaccination.<sup>[9]</sup> As it is a record-based study, we do not know why the remaining 15.7% dog bite cases did not receive the PEP. It can also be attributed to the fact that the bite may be a category 1 wound or a less severe one. Among the 176 dog bite cases who received first dose of ARV, only 42.6% had received the second dose of PEP. Third, fourth,

**Table 1: Demographic characteristics of rabid bite cases attending the health center over a span of 1 year**

Source of bite	Age group (years)	Gender		Percentages Total n (%)
		Male (n)	Female (n)	
1) Dog bites				
	0-12	19	37	56 (26.54)
	13-19	6	12	18 (8.53)
	20-35	17	35	52 (24.64)
	36-59	21	36	57 (27.27)
	>60	12	14	26 (12.44)
	Total	75 (35.8)	134 (64.11)	209 (100)
		Male (n)	Female (n)	Total n (%)
2) Cat bites				
	0-12	2	0	2 (15.38)
	13-19	2	0	2 (15.38)
	20-35	1	0	1 (7.69)
	36-59	2	3	5 (38.46)
	>60	2	1	3 (23.07)
	Total	9 (69.23)	4 (30.76)	13 (100)



**Graph 1:** Distribution of cases of rabid animal bites attending the primary health center annually

**Table 2: Relationship between age and completion of the full dose of postexposure prophylaxis following dog bites**

Age group (years)	ARV 1 (n=207)		ARV 2 (n=209)		ARV 3 (n=209)		ARV 4 (n=209)		ARV 5 (n=209)	
	Given	Not given								
0-12	45	11	21	35	13	43	1	55	0	56
13-19	18	0	7	11	3	15	0	18	0	18
20-35	44	8	14	38	12	40	1	51	0	52
36-59	48	9	23	34	20	37	1	56	0	57
>60	21	5	10	16	6	20	4	22	2	24
<i>P</i>	0.362		0.677		0.454		0.012		0.008	
$\chi^2$	4.343		2.322		3.661		12.929		13.760	

**Table 3: Distribution of cat bites attending the health center over a span of 1 year and postexposure prophylaxis**

Age group (years)	No. cat bites		1 Dose of ARV received	
	Male	Female	Male	Female
0-12	2	0	0	0
13-19	2	0	0	0
20-35	1	0	0	0
36-59	2	3	0	1
>60	2	1	1	0

and fifth doses were received only by 31.03%, 8.04%, 1.14%, respectively [Table 2]. This can be attributed to the fact that the cases might have skipped the schedule considering that they are healthy or lack of awareness about the fatal disease and its prevention through PEP. Few people might have taken the dose at a different health center. However, it cannot be considered as a majority because only 1.14% has completed the entire schedule of prophylaxis. In another study conducted at Bangalore, the factors related to noncompliance were found to be forgetfulness, cost incurred, distance from the hospital, and loss of wages.<sup>[10]</sup> However, this is a record-based study, we could not find out the above associations and other sociodemographic details such as literacy, occupation status, whether the bite is domestic or stray dogs, if the cases have taken vaccination at other centers, and the factors influencing the compliance of vaccination. Hence, to generate ideal data on compliance for vaccination every rural health care centers can maintain detail data on the above factors of the bite cases. General practitioner or family physician should have regular updates about recent modification in management protocol as they are the first contact of care in rural area.<sup>[11]</sup> This will also help us generate the reasons for noncompliance and take preventive measures in a rural health set-up.

In our study, we have observed that the last 2 doses (ARV 4 and ARV 5) were taken mostly by the elderly population >60 years of age. In fact, the 1.14% dog bite cases who completed the entire PEP is the elderly. Thus, we found statistical correlation between age and compliance of PEP significant and similar findings were present in other conducted studies.<sup>[12]</sup> But the proportion of dog bite cases who received full dose of PEP in our study is very much less than that reported in other studies.<sup>[13]</sup> Lack of awareness about rabies is one major reason for nonadherence to appropriate schedule of vaccination.<sup>[14]</sup> Poor counseling of cases concerning adherence to the ARV dosage and complications resulting in nonadherence is a major concern. Hence, general physician who has won trust of patients over years has an extra edge while counseling these cases from rural area as doctor-patient barrier is minimum. Our study finding shows that out of the 49.55% rabid bites reported in the PHC over a span of 1 year, 2.9% (13) were cat bites. Nine cases (69.23%) were males and 4 cases (30.76%) were females. In a study conducted at Ethiopia, around 2.6% cat bites were reported.<sup>[1]</sup> Cat bites were the second most common source of injuries requiring PEP against rabies after dog bites.<sup>[1]</sup> In our study, among the cat bite cases, only 2 of them are given 1 dose of ARV, reason being uncertain. But cases of rabies from

this rural area are not being reported. Table 3, denotes, the total number of cat bite cases and postexposure prophylaxis attending the PHC over a span of 1 year is 13 (2.9%).

## Conclusion

Rabies is a neglected tropical disease and is almost always fatal. Vaccination is the most effective way to interrupt the rabies transmission cycle. Steps must be taken to ensure completion of the full course of PEP. Integrated bite case management (IBCM)—a program linking public health and veterinary sector—can be done.<sup>[4]</sup> Concept of One Health approach is very essential for prevention of rabies. If the animal remains normal then further dose of vaccination can be discontinued, that is, the last 2 doses. All these can be done when people in different sectors are adequately trained and quarantine facilities made available for observation of dogs. Intersectoral coordination among the various departments will help in strengthening the primary care and alleviate the cases of rabies in rural area. An adequate supply of ARV must be ensured at all government hospitals. Further, telephonic calls or text messages can be done to remind people about the next dose of vaccination and integrated reporting of all rabid bites must be done. Proper record maintenance has to be done of all rabid bites and compliance of PEP. Health centers in rural areas should maintain registers regarding deaths due to rabies. Hence, it is important for the general awareness among the people about signs and symptoms of rabies, so that reporting of rabies can be done at the earliest.

## Limitations

As this is a record-based study, we did not have adequate information regarding the nature of the bite, vaccination status of the animal, and the reason for not continuing further doses of vaccination. The study was on the basis of finding from only 1 rural primary health center and therefore cannot be generalized to the entire population.

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## Conflicts of interest

There are no conflicts of interest.

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